Hawaii
Stream Visual
Assessment Protocol

USDA
Natural Resources Conservation Service
January 31, 2001

VERSION 1.0

GUIDANCE DOCUMENT

FOR COMPLETING THE FORMS:

EQUIPMENT LIST

Rubber boots, tabis or footwear that can get wet
Measuring tape (100m water resistant one is the best; 30 meter or 100 foot tape will do. Ensure you use same measurement units for all.
Meter or Yard Stick (for depth measurements)
Calculator
Watch with second count
Temperature probe (F or C)
Velocity meter or Guava /orange peels (for velocity test)
Flow meter (optional)
Sunscreen
Mosquito Repellant

OVERVIEW DATA SHEET:

Date/Evaluator(s)/Stream Name/ etc. – Fill out the top of the form. The Hydrologic/Watershed unit number and acres can be obtained from the NRCS Arcview database (Currently, Field Office staff should contact State Office GIS staff for this information if you do not have the information on hard copy maps).
Stream Order – This refers to the stream's connection to the ocean. First order streams would directly flow into the ocean; second order streams would feed into that stream that flows directly into the ocean; etc. Most streams in Hawaii are 1^{st}, 2^{nd}, or 3^{rd} order streams. Note Yes/No if stream is tributary (connected to the ocean)
Fish Species/Endangered /Flow/Water Quality/Ownership/Major land use – Check the appropriate maps and databases, as applicable or available. There also may be Environmental Assessments or EIS' completed on the stream that would be helpful. Check OEQC or with County Planning. Evaluation of other land uses in the watershed is important for later determining restoration activities. Also, the client and other landusers in the area may have knowledge about the history, land uses, aquatic habitat, etc, so always query them.
Other Comments – If there have been other evaluations of the stream conducted, these should be mentioned and attached. Other comments might include landowner's participation in USDA programs, etc.

SCORING DATA SHEET:

CHARACTERIZATION

The following information will introduce the overall description of the stream reach being evaluated. These data can be used to follow changes over time (e.g. temperature fluctuations or substrate changes). Also, some of the information will be used in the second section, when you evaluate and "score" specific stream elements.

Date/Time/Weather/Stream Name/Surveyors – Fill out the top of the form. For weather, note approximate air temperature, cloud cover, precipitation, and wind.
Reach ID – The Reach ID is a number or letter identifying the reach on a quad map or other map of the stream. For this protocol, the length of the assessment reach is 20 times the active channel width, or a minimum of 100 meters/300 feet; maximum 300 meters/900 feet. The reach (es) to be sampled should be identified after the Overview is done and areas are looked at on aerial photos. Reaches should be representative—that is, there should not be a major change within the same reach (e.g. break into two reaches estuarine part of the stream vs. the upper part).
Stream Type – There are numerous kinds of classification systems. The recommended system for this protocol is one developed by Montgomery and Buffington. It recognizes six classes of alluvial channels – cascade, step-pool; plane-bed; riffle/pool, regime, and braided (based in large part on stream gradient). See the attached stream classification sketches, and pick the one that best fits the situation.
Segment Length – Measure or estimate the channel length (in meters or feet) of each Segment or habitat unit being evaluated (typically 20 meters, which is 100 meters divided by 5, or 60 feet, which is 300 feet divided by 5). Most categories evaluate the entire Segment. The number of Segments depends on the size of the reach (minimum three per reach; five is typical; more is better).

Temperature – Use a hand-held thermometer in at least 3 places in the Segment (include shady and open canopy areas if they occur within the segment), get an average, and enter the current stream temperature in Fahrenheit or Celsius. If the time of day for temperature measurement is different than time recorded at top of the form, note the time as well.
Substrate Composition – To estimate this important characteristic, split your segment equally into four plots (e.g. mark off every 5 meters on your 20 meter tape), visually assess substrate within the 5 meter rectangle by estimating cover/composition. Use the following definitions of terms for substrate:

- Silt/Clay – very fine sediment
- Sand – like beach sand
- Gravel – larger than sand; smaller than your thumbnail
- Cobble – larger than your thumbnail, smaller than your fist
- Rock – larger than your fist, smaller than your head
- Boulder – larger than your head or basketball
- Bedrock or concrete bottom – natural solid rock base or human-made concrete/rock bottom (circle which one)

Use the attached Munsell chart as a guide to assess cover. Make tally marks (or a dot count tally) of the top two dominant substrates per plot. If only one substrate dominates the plot, make two marks for that kind of substrate. Then add up tally marks for each kind of substrate and divide that number by 8 to get the overall percentages per substrate type. Also note the composition of the bank materials in "remarks" section.
Embeddedness – Embeddedness measures the degree to which cobble substrate is surrounded by fine sediment (sediment load in streams). It can relate to the suitability of the stream substrate as habitat for macroinvertebrates and fish, or show effects of sedimentation from the upper watershed. It can only be evaluated in riffle and run habitats. One to four representative sites in these types of habitats should be chosen along the Segment. If there are no riffles or runs, write "No RI or RU". If there are, measure the depths to which objects are buried by sediment. This assessment can be accomplished by picking up gravel or cobble with your fingertips and estimating what percent of the stone was buried. At least 50 measurements should be taken, then averaged to produce the overall percentage of embeddedness. Use the back of the scoresheet to document and average your 50 measurements.
Bank Vegetation –Estimate the percentage cover of trees, shrubs/saplings, herbaceous, leaf litter or bare bank viewed upstream along the left and right bank. Look at the area directly adjacent to the stream and use the following definitions of terms:

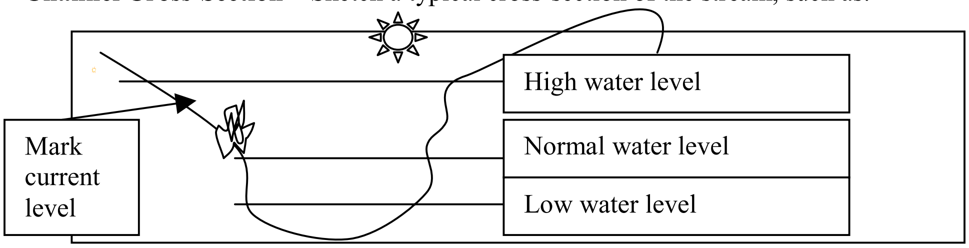
- Tree = a woody plant > 3.0 inches in diameter at breast height.
- Shrub/Sapling = a woody plant < 3.0 inches in diameter at breast height and > 3.2 feet in height.
- Herbaceous = all non-woody plants, regardless of height, and woody plants < 3.2 feet in height.

You should look downstream along the left and right bank of the Segment . In "notes" at the bottom of the page, list the dominant plant species for each segment and any notes about shallow or deep roots. Look at the area directly adjacent to the stream (along the banks). Ground coverage, not canopy, is what you should be estimating.
Average % Canopy/Shade – Record the average percentage of canopy cover over the active stream channel (where the water typically is, not the riparian area). You can either use a densiometer over the active channel, or visually assess the relative amount of shading or concealment of the stream by vegetation. For wide streams/rivers, do not consider the area where no shade is possible. The Munsel Chart guide can be used to visually assess this element.
Average Actual Width -- Cross section widths can be measured by a measuring taped stretched perpendicular to the stream flow across the stream at the normal water level. At least five measurements across the stream should be taken and averaged. Note average on form
Velocity and Depth – To determine velocity, two methods can be used. (1) a guava (or an orange) can be dropped at the top of the segment and timed to the end of the segment to get meters per second, then multiply by a roughness factor of either 0.6 (for rough boundaries) or 0.8 for smooth channels. This multiplier is important, since the guava will find the path of least resistance, and velocity in the channel varies. Do this at least ten times and take an average of the scores. OR (2) use a velocity meter at the same crossing where you measure depth. To determine depth, take at least ten measurements with your yard or meter stick at the same locations where you measured width, and average the scores.
Flow Status- Compare the current water level to the normal water level, and record as high, normal, or low. The normal water line is the line on the bank created by natural level fluctuation as evidenced by destruction of terrestrial vegetation, litter/debris lines, shelving, and changes in soil characteristics. Circle High/Normal/Low.

- High = if upland vegetation or area typically dry is submerged
- Normal = if water level appears to be within normal flow fluctuations
- Low = if water level is significantly lower than normal, as seen by bare areas exposed or wetland vegetation exposed and dead or dying.

Flow – If you have a flow meter, use it in at least your five transect plots used to assess substrate and get an average flow in cubic meters per second. If you do not have a flow meter, take the area of the cross section (your average depth multiplied by your average width) and multiply this number by your velocity number to get cubic meters per second.

Channel Cross-Section – Sketch a typical cross-section of the stream, such as:



THE TEN SCORED ELEMENTS

SCORING

This section involves evaluating different elements of the stream and documenting a score (from 0 to 2.0, low to high rating). Use the "Scoring Sheet for the Elements" for the rating. The total all of the scores recorded will be divided by the number of elements rated for the average score (typically 10, unless for instance embeddedness is not scored because there were no riffles or runs in the Segment). A general stream rating can be obtained from this score. This score can be compared over time, if more than one evaluation is done, or by segment, to determine most degraded or best segments for future restoration. Not only should this overall score be regarded. The evaluation of each scored element should be carefully assessed to determine the degraded elements in the system and to identify potential restoration actions.

1. TURBIDITY

Clarity of the water is an obvious and easy feature to assess. The deeper an object in the water can be seen, the lower the amount of turbidity. Use the depth that objects are visible only if the stream is deep enough to evaluate turbidity using this approach. For example, if the water is clear, but only 20 cms deep, do not rate it as if an object became obscured at a depth of 20 cms. This measure should be taken after a stream has had the opportunity to "settle" following a storm event. This element cannot be measured after recent heavy rains (come back to the site another day). Recognize that organic acids can create tea-colored water; this is not turbidity and should not be counted as turbid. Identify the condition and note the score on the datasheet.

2. PLANT GROWTH

Water that has slight nutrient enrichment may support communities of algae, which provide a greenish color to the water. Streams with heavy loads of nutrients have thick coatings of algae attached to the rocks and other submerged objects. Floating algal mats, surface scum, or microbial sheen (ferri hydrite) are indicators of a eutrophic stream. Note the level of plant/algal growth on the datasheet.

3. CHANNEL CONDITION

Changes in the channel may affect the way a stream naturally does its work, such as the transport of sediment and water, and the development and maintenance of habitat for fish, aquatic insects, and aquatic plants. Some modifications to the stream channels have more impact on stream health than others. And some stream types are more sensitive to management stress than others. For example, riprap along the sides and bottom of the Segment can affect a stream more than channelization. Active downcutting and excessive lateral cutting are serious impairments to stream function. Both conditions are indicative of an unstable stream channel. Usually, this instability must be addressed before committing time and money toward improving other stream problems. Extensive bank-armoring of channels to stop lateral cutting usually leads to more problems (especially downstream). To score this element, pick the condition that best characterizes the Segment and document the score on the data sheet.

4. CHANNEL FLOW ALTERATION

Water withdrawals from the stream have potential to affect habitat conditions and change the biological and geomorphological conditions of the stream. Temporary diversions are those that are not meant to last (e.g. small rock diversions for taro that would blow out during a normal storm event). Intermittent withdrawals are those that are occasional or periodic. Any flow alterations outside of the segment should not be counted in this element; instead, note distant diversions/inputs in the "Overview" sheet. If temporary or intermittent, the score should reflect also the amount of water being taken, scoring higher within the range if minimal water is being diverted. Also note if there are inputs, such as stormwater outfalls or culverts in the segment. Record score on the data sheet.

5. PERCENT EMBEDDEDNESS

Review your average number in the Characterization Section on "Percent Embeddedness", Pick the appropriate percentage and note the score on the data sheet. If there were no riffles or pools in the segment, do not score this (and divide total score by 9 instead of the 10 elements)

6. BANK STABILITY

This element is the potential for soil erosion from the upper and lower stream banks into the stream. Some bank erosion is normal in a healthy stream. Excessive bank erosion occurs where riparian zones are degraded or where the stream is unstable because of changes in hydrology, sediment load, or isolation from the flood plain. High and steep banks are more susceptible to erosion or collapse. A healthy riparian corridor with a vegetated flood plain contributes to bank stability. The type of vegetation along the banks is important. For example, most trees, shrubs, sedges, and rushes have the type of root masses capable of withstanding high streamflow events, while pioneer species (such as guinea grass) do not. Mulch can also act as a stabilizer (e.g. ironwood twigs). Hardened banks (e.g riprap) are also stable. Soil type at the surface and below the surface also influences bank stability. Look for signs of erosion, unvegetated stretches, exposed tree roots, or scalloped edges. Evidence of construction, vehicular, or animal paths near banks or grazing area leading directly to the water's edge suggest conditions that may lead to the collapse of banks. Take into account the six key factors that influence stability:

1. Bank Height
2. Bank Angle
3. Bank Composition
4. Root Depth
5. Root Density
6. Surface Protection

Estimate the size or area of the bank that is bare and unstable, relative to the total bank area. Total bank area includes the slope and area immediately adjacent that if unstable would erode into the stream. This element will be difficult to score during high water. Calculate the ratio of eroded-disturbed bank /total area, yielding a percent stable bank value.

7. CANOPY/SHADE

This element is the measurement of shade across the active channel. Shading of the stream is important because it keeps water cool and limits the growth of less preferred types of algal. Cool water has a greater oxygen holding capacity than does warm water. When streamside trees are removed, the stream is exposed to the warming effects of the sun, which can change plant and animal species composition and abundance. For instance, alien fish such as tilapia are more adaptable to high water temperatures than the native Hawaiian gobies. Review your numbers under the Characterization Section on Average % canopy/shade, and determine if the canopy is open, closed, or in-between.

8. RIPARIAN WIDTH/CONDITION

"Riparian area" is the width of the natural vegetation zone from the edge of the active channel (or normal water line) out onto the flood plain. For this element, the word *natural* vegetation means plants native to the site or introduced species that function like them.

In most cases, this zone:

- Reduces the amount of pollutants that reach the stream in surface runoff.
- Helps control erosion.
- Provides a microclimate that keeps the water cool for stream biota.
- Provides fish habitat in the form of undercut banks with the "ceiling" held together by roots of woody vegetation.
- Provides organic material for stream biota that, among other functions, is the base of the food chain in lower order streams.
- Provides habitat for terrestrial insects, and habitat and travel corridors for terrestrial animals.
- Dissipates energy during flood events.
- Often provides the only refuge areas for fish during out-of-bank flows (behind trees, stumps, and logs).

In Hawaii's streams, we often find highly incised stream channels with steep-sloped riparian areas in their "natural" condition. This means that the stream is in the evolutionary stage of headcutting. It will typically have a gradient greater than 3%, and should not be scored lower because it is not yet in the stage of having floodplains or terraces. For example, many of the pristine Hawaiian headwater streams are in this stage (e.g. upper reaches of Limahuli Stream on Kauai).

The type, timing, intensity, and extent of activity in riparian zones are critical in determining the impact on these areas. Narrow riparian zones and/or riparian zones that have roads, agricultural activities residential or commercial structures, or significant areas of bare soils reduce stream functions. The filtering function of riparian zones can be compromised by concentrated flows. Look for evidence of concentrated flows through the riparian zone.

Compare the width of the riparian zone to the active channel width. In this case, observe how much of the flood plain is covered by riparian vegetation. The vegetation must be natural. take particular note of pioneer, invasive species. These do not provide good cover or stability to the banks and can wash away after storm events. Vegetation should consist of all of the structural components (aquatic plants, sedges or rushes, grasses, forbs, shrubs, understory trees, and overstory trees) appropriate for the area.

Examine both sides of the stream (looking downstream) and note on the "Channel cross section" diagram which side of the stream has problems. Check for evidence of concentrated flows through the riparian zone that are not adequately buffered before entering the riparian zone. Pick the condition that best characterizes the Segment and document the score on the data sheet.

9. HABITAT AVAILIBLE FOR NATIVE SPECIES

This assessment element measures availability of physical habitat for native Hawaiian stream organisms. The potential for the maintenance of a healthy aquatic plant and animal community and its ability to recover from disturbance is dependent on the variety and abundance of suitable habitat and flow available.

Observe the number of different habitat and flow types within each Segment and document the score on the datasheet. If there is flow, there will be at least one type of habitat available. Each flow type must be present in appreciable amounts to score. Flow types are described below.

(1) Seeps and Springs (SS)– Areas in the riparian area where there is groundwater input (cooling the water and providing habitat to native aquatic invertebrates).
(2) Pools (PO)– Areas characterized by smooth undisturbed surface, generally slow current, , and typically deep (deep enough to provide protective cover for fish. Included in this habitat would be deep "plunge" pools at the base of a cascade or waterfall.
(3) Runs (RU) – Areas characterized by moving water, but no broken water surface or whitewater
(4) Riffles (RI) – Areas characterized by broken water surface, rocky or firm substrate, moderate or swift current, and relatively shallow depth (usually less than 18 inches). Generally, flow is fast and shallow.
(5) Cascades (CA) – Waterfalls, or basically steep riffles (greater than 3% gradient)

Chose a high score within the range if there are multiple numbers of each flow type within the reach, or if the substrate is more compatible to native species. Decide on a score in the higher range if there are numerous pools, runs or riffles versus one of each. The range of scores allows best professional judgement to suit each unique situation.

10. LITTER/TRASH

The presence of litter, trash and fish or animal carcasses are obvious signs of stream degradation. Assess the presence in both the wetted area and riparian zone. Note the condition and score on the datasheet.

EVALUATION

The following ideas are a few examples for improving the various stream elements. It is important to have interdisciplinary input from experts in geomorphology, engineering, plant ecology and fish and wildlife biology.

1. **Turbidity** – Improve water quality by reducing sediment loads into the stream, by revegetating banks, reducing inputs from fields, or other means.
2. **Plant growth** – Improve water quality by reducing nutrient loading in the stream (e.g. nitrates and phosphates). Improve canopy cover to encourage compatible species of algal growth.
3. **Channel Condition** – Evaluate ways to reconnect or enhance the connectivity of the stream channel to its floodplain, where applicable
4. **Channel Flow Alteration** – Evaluate ways to restore altered sites, producing changes in hydrology (e.g. bioengineering, removing diversions)
5. **Percent Embeddedness** – Reduce fine sediment input from the upper watershed and/or eroding streambanks.
6. **Bank Stability** – Improve bank stability with a wide riparian buffer, better channel conditions and bioengineering methods. Note that if there is major, contiguous erosion occurring around a bend, it may be a system-wide problem that needs to be addressed, compared with small eroding spots that may be treated on site.
7. **Canopy/Shade** – Enhance canopy over the stream to keep water temperature cool with plantings and management.
8. **Riparian Condition** – Improve conditions with plantings and management for a wide riparian buffer
9. **Habitat Available for Native Species –** Evaluate ways to improve habitat conditions for native flora and fauna (e.g. flow, water depth, roughness of the channel)
10. **Litter/trash** – Clean up litter/trash in the stream and stream riparian areas and set up regular trash pickup.

OVERVIEW DATA SHEET

Date______________Evaluator(s)____
Stream Name_____________________________Tributary to:__________________________________
Tributary to:_____________________________Tributary to:_________________________________
County_______________________USGS Quad name_______________________________________
Location (TMK)__________________Latitude_____________Longitude____________________
Landowner / Access____

____
Hydrologic/Watershed Unit____
Aerial Photos (include scale/flight elev)____
Stream Order___________Connected to ocean at least 1x/year?_______Total length_______miles
Drainage Area__________sq.mi. Stream Length_________ Summer Base Flows____cfs or cms
Elevation range of reach___________feet/meters Headwaters_____________feet/meters

Fish and other animal species (known to exist in stream, from HI stream assessment and/or personal contact with experts) ____

____
____
____

Endangered / Threatened / Proposed / Candidate / Sensitive Species (check The Nature Conservancy Heritage Database)____

____
____
____

Stream Flow Data (Check USGS database)(give sta + elevation)_________________________

____

Water Quality Data (Check w/ DOH)____

____

Ownership along Stream (miles) Federal_______State_______Private______ (attach map if possible)
Additional information____

____
____

Major Land uses and other resource issues in the Watershed (e.g. groundwater withdrawals; buffalo grazing downstream; taro cultivation; urban impacts; roadways crossing stream) (attach map if poss)

____
____
____
____
____

Other Comments____

____
____
____
____
____
____
____

SCORING SHEET FOR THE ELEMENTS

1. TURBIDITY (indicator of present erosion)

Condition	Score
Very clear; objects visible at depth to the bottom.	2.0 - 1.5
Moderately turbid	1. 0 – 0.5
Very turbid	0

2. PLANT GROWTH (indicator of eutrophication)

Condition	Score
Water clear with no significant algal scum or microalgae; rocks may be slimy but algae not obvious	2.0 - 1.5
Large clumps of macroalgae present, or distinctive green/brown scums visible on bottom or sides of stream	1. 0 – 0.5
Water distinctly green or pea green; or channel choked with grasses	0

3. CHANNEL CONDITION

Condition	Score
Natural Channel	2.0 – 1.8
Channelized by humans but natural walls and bottom	1.7 – 1.2
Walls Hardened (e.g. concrete, riprap)	1.1 – 0.6
Walls and Bottom Hardened	0.5 – 0

4. CHANNEL FLOW ALTERATION

Condition	Score
No withdrawals, diversions, or stormwater/ag water discharge entering segment.	2.0 – 1.8
Temporary, Intermittent withdrawals occurring within segment.	1.7 – 1.2
Permanent, Intermittent withdrawals or stormflow inputs (e.g. culverts occurring within segment.	1.1 – 0.6
Temporary, Constant withdrawals occurring within segment.	0.5 – 0.2
Permanent, Constant withdrawals occurring within segment.	0 – 0.2

5. PERCENT EMBEDDEDNESS

Condition	Score
< 10%	2.0
11 – 25 %	1.5 – 1.0
26 – 50 %	0.9 – 0.5
50 – 75 %	0.4 – 0.2
Completely sedimented in (includes hardpan sedimentation)	0

6. BANK STABILITY (total, both sides)

Condition	Score
> 90% Stable (not bare or erodable)	2.0
75 to 89% Stable (not bare or erodable	1.5 – 1.9
50 to 74% Stable (not bare or erodable)	1.4 – 1.0
25 to 50% Stable (not bare or erodable)	0.9 – 0.1
<25% Stable (not bare or erodable)	0

7. CANOPY / SHADE

Condition	Score
Mixed canopy, 20 - 80% cover	2.0 - 1.6
Closed but mixed canopy, >80% cover	1. 5 – 1.0
Closed monotypic canopy >80% cover	0.9 – 0.5
Open canopy, 0- 19% cover	0

8. RIPARIAN CONDITION

Condition	Score
Riparian area same width as floodplain, diverse vegetation, or stream is naturally incised, stable banks. Undisturbed.	2.0 – 1.8
Riparian area width at least two channel widths wide, diverse vegetation, or stream is naturally incised. Minimal Degradation	1.7 – 1.0
Riparian area width at least one channel width wide, or stream is naturally incised, riparian area is somewhat degraded. Regularly grazed, cropped or other disturbance.	0.9 – 0.5
Severely degraded riparian area, less than one channel width wide.	0.4 – 0.2
Little to no riparian vegetation, dirt-lined or fully channelized and lined.	0

9. HABITAT AVAILABLE FOR NATIVE SPECIES

Condition	Score
5 habitat types available	2.0
4 habitat types available	1.9 – 1.8
3 habitat types available	1.7 – 1.0
2 habitat types available	0.5 – 0.2
1 habitat type available	0

***Habitat types**: (1) seeps/springs (2) pools (3) runs (4) riffles (5) cascades*

10. LITTER/TRASH (indicator of urban/human influence)

Condition	Score
No litter or trash is present.	2.0 - 1.8
Litter or trash is evident but not prominent.	1. 0 – 0.5
Abundant trash, unsanitary wastes, eg. animal carcass or excrement, diapers, or many dead fish.	0

SCORING DATA SHEET

Date		*Time*		*Weather*	
Stream Name		*Reach ID*			
	Segment #1	*Segment #2*	*Segment #3*	*Segment #4*	*Segment #5*
Stream Type					
Segment Length (ft or m)					
Temperature					
Elevation					
Substrate	*1 2 3 4 %*	*1 2 3 4 %*	*1 2 3 4 %*	*1 2 3 4 %*	*1 2 3 4 %*
Silt/clay					
Sand					
Gravel					
Cobble					
Rock					
Boulder					
Bedrock or Concrete					
Embeddedness %					
Bank Vegetation % - looking downstream, left bank / right bank					
Trees					
Shrubs					
Herbaceous					
Leaf Litter					
None (bare)					
Avg % canopy/shade					
Avg Width					
Velocity and Depth					
Flow Status:	*high/normal/low*	*high/normal/low*	*high/normal/low*	*high/normal/low*	*high/normal/low*
Flow (cfs) or (cms)					
Sketch Channel cross-section, include low, normal, and high flow lines and existing water level					
Score Each Element - Use "Scoring Sheet for the Elements" Guidance					
1. Turbidity					
2. Plant Growth					
3. Channel Condition					
4. Channel Flow Alteration					
5. Percent Embeddedness					
6. Bank Stability					
7. Canopy					
8. Riparian Condition					
9. Habitat Available					
10. Litter/Trash					
Total score					
Total score / # of elements					
Rating of Average					
1.8 - 2.0 Very High					
1.5 - 1.7 High					
1.1 - 1.4 Medium					
0 - 1.0 Low					

***Notes**: ie. wildlife sightings, vegetation species, etc.*

TECHNICAL NOTE

USDA NATURAL RESOURCES CONSERVATION SERVICE HAWAII

Biology Technical Note - No. 9

HAWAII STREAM VISUAL ASSESSMENT PROTOCOL

Introduction

This coversheet transmits a copy of the NRCS Hawaii Stream Visual Assessment Protocol (HSVAP), Version 1.0. The HSVAP provides a first step, basic level of stream quality evaluation, based primarily on physical conditions. It can be used to determine the current stream condition as a snapshot, or used to observe changes over time. It can also be used to identify the need for more thorough assessment methods that focus on a particular aspect of the aquatic system (e.g. water quality or aquatic species habitat).

Conservationists with only limited knowledge of biology or hydrology can perform the assessment, after minimal training. NRCS staff should in most cases conduct the assessment with the client, as part of the field inventory of all resources -- Soil, Water, Air, Animals, Plants, and Humans (SWAPA+H). This first-step assessment will show the overall quality of the stream, and more importantly, the specific elements that are indicators of poor quality or deterioration of stream habitat. The elements can then be evaluated for potential restoration actions.

This protocol is based on the national version of the NRCS Stream Visual Assessment Protocol (NWCC Technical Note 99-1, December 1998). Initially, stream experts in Hawaii were asked to provide comments, and it became clear that numerous changes were needed to reflect Hawaii's unique stream conditions. NRCS Hawaii convened stream experts and other interested parties from around the state, beginning in January 1999. After a year of little activity on the protocol, the "Stream Bioassessment Working Group", which consisted of interagency, academic, and community group leaders interested in stream assessments, was formed. The NRCS State Biologist chaired the meetings. The group provided numerous review comments, both written and oral, from the meetings and the field site tests. The protocol became a work in progress (twelve drafts) for a year, and was modified substantially to better reflect stream conditions in Hawaii. The attached HSVAP is in its final form as Version 1.0.

Contents of the protocol include: (1) An *Equipment List* and (2) a *Guidance Document*, which explains each step in filling out the assessment forms, and defines and clarifies how the user should characterize and score the elements used to evaluate stream conditions. The *Guidance Document* can be utilized in the field as the *Overview Data Sheets* and the *Scoring Data Sheets* are being filled out.

Field Site Trials

The purpose of the field trials was to evaluate the accuracy, precision, and usability of the HSVAP. Stream Bioassessment Working Group members assessed a variety of streams that represent typical stream systems in the state. Many sites chosen were those that had previously been assessed, either by the National Water Quality Assessment team at USGS using strict national guidelines; or by the Department of Health/Stream Research Center, using the Hawaii Stream Bioassessment Protocol (Kido, Smith, Heacock, December 1999). Streams chosen reflected differing conditions, including a range from least-impacted reference sites → somewhat degraded → highly degraded; and sites with different flow regimes (such as Kawela stream and Hanalei River). Typically, 8 – 10 members of the Stream Bioassessment Working Group participated in the field. Eleven streams (one or two days each) were evaluated, including:

Most degraded

- *July 15th, 1999 Waikakalaua Stream, Oahu*
- July 21st, 2000 Unnamed Stream, Bellows AFB, Oahu
- August 10th, 2000 Waimanalo Stream, Oahu

Mid range, less degraded

- May 3rd, 2000 Waihee Stream, Oahu
- August 24th, 2000 Kawa Stream, Oahu
- November 9th 2000 Kawela Stream, Molokai
- December 5th, 2000 Iao Stream, Maui,
- January 12th, 2001 Maunawili Stream, Oahu,
- January 18th, 2001 Hanalei River, Kauai

Reference Conditions

- December 14th, 2000 Waiahole Stream, Oahu,
- February 25th, 2000 Limahuli Stream, Kauai
- January 17th, 2001 Limahuli Stream, Kauai

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